



Perspectief programme 2015 - 2020

CANCER-ID

Blood test for better cancer treatment

A simple blood test that shows whether the tumour cells of a cancer patient are responding to treatment without the need for expensive medical scans. That is the ultimate aim of the research within the Perspectief programme CANCER-ID.

'In recent years, it has become clear that blood contains small vesicles that originate from both healthy and diseased body cells, such as tumours. However, no technology was available yet to observe these extracellular vesicles', says programme leader Leon Terstappen from the University of Twente. 'That is what we've worked on in the CANCER-ID programme.'

More accurate image

The researchers have discovered that the survival of patients with metastases of breast, prostate, intestinal or non-small cell lung cancer can be predicted from the number of vesicles excreted by the tumours. As the extracellular vesicles can also originate

from small metastases that are not visible on MRI or PET scans, they provide a more accurate picture of the disease's progression. The CANCER-ID programme saw a collaboration between ten PhDs and two postdocs within nine projects and with 22 companies. Four projects investigated how the blood samples should be collected and prepared and how researchers can subsequently detect extracellular vesicles in these. Within the other five projects, the researchers established which clinical information the extracellular vesicles could contain and how to distinguish vesicles originating from diseased and healthy cells.

Aim

The aim of Cancer-ID was to be able to detect and analyse vesicles excreted by cells in the blood. These can contain information about diseases such as cancer. They are about the size of blood platelets or viruses. However, a drop of blood contains one thousand billion times more proteins than extracellular vesicles, and only a few of the vesicles present originate from the diseased cells that are of interest. It is therefore like looking for a needle in a haystack.

What was investigated?

Within the programme, ten different techniques were developed and evaluated that can be used to detect small numbers of extracellular vesicles in a drop of blood. The researchers used these techniques to take measurements

of blood platelets, red blood cells and extra-cellular vesicles originating from prostate tumours. With this approach, they identified which combinations of measurement techniques can be used to count the tumour extracellular vesicles with the greatest specificity and sensitivity.

What has the programme yielded?

‘Cancer-ID has laid the foundations for cancer detection based on extracellular vesicles excreted by tumours’, Terstappen states. ‘Using techniques such as electron microscopy, Raman spectroscopy and atomic force microscopy, we have collected a wealth of information about the properties and origin of the various types of extracellular vesicles. We have also developed sensitive methods to find five individual extracellular vesicles just one micrometre in size in a drop of blood that is full of proteins, lipids, blood platelets, and blood cells. Studying these vesicles will be easier now that we can see them.’

Outstanding questions include how vesicles that originate from a tumour cell can be distinguished from vesicles excreted by a healthy cell. ‘In addition, the vesicles seem to play a role in the communication between cells. However, it is not yet clear exactly how that works.’

Two of the researchers involved have set up the company ECsens to market some of the techniques developed. As the dimensions of the extracellular vesicles are similar to those of viruses, ECsens has also focused since 2020 on detecting small amounts of coronavirus in throat and nose smears. To this end, the company received, for example, a Small Business Innovation Research grant from the Netherlands Enterprise Agency (RVO).

Perspectief focuses on creating strong collaborations between researchers, companies and societal organisations, leading to technological innovations with potential economical and societal impact.

Visit nwo.nl/perspectief-en



Ministerie van Economische Zaken
en Klimaat

Facts and figures

▼ Research institutions

- ▶ Delft University of Technology
- ▶ University of Groningen
- ▶ University of Twente
- ▶ Utrecht University
- ▶ Wageningen University & Research

▼ University medical centres

- ▶ Amsterdam UMC
- ▶ Erasmus MC
- ▶ VUmc

▶ Companies 22

▶ Top sector

High Tech Systems & Materials

▶ Total budget 5.8 million euros

▶ Co-funding 1.8 million euros

▼ Highlights

- ▶ First step towards clinical tests with the measurement of vesicles for monitoring cardiovascular diseases
- ▶ Establishment of the start-up company ECsens, which is now also developing rapid tests for COVID 19